QUALITY CONTROL REPORTS FOR

SEMI DENSE BITUMINOUS CONCRETE

CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

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Job No.: CTCE/BBMP/HSN/W.No.07/QB(SDBC)/2014-15 16.06.2014

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

CLIENT	:	**Asst. Executive Engineer**, Kodigehalli Sub Division, BBMP, Bangalore.
AGENCY	:	**Mr. H.S. Nataraj,** Contractor, Bangalore.
NAME OF THE WORK	:	Improvements to Roads, Drains and Asphalting to Roads in Vinayaka Layout 3rd Cross, 1st Stage in Ward No.07, Byatarayanapura, BBMP, Bangalore.
REFERENCE	:	EE/BTP/BBMP/E-TND/470/2012-13 Dated: 20.03.2013
SOURCE OF LOCATION	:	Hot mix Plant, Bangalore
DATE OF TESTING	:	16.06.2014

The results of the tests conducted on the bitumen sample for Semi Dense Bituminous Concrete are as follows:

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 ^{0}C, 1/10 mm	IS :1203 -1978 (RA-2009)	85	80 to 100
2	Softening point, ^{0}C	IS :1205 -1978 (RA-2009)	42	Min. 40
3	Ductility at 27^{0}C, cm	IS :1208 -1978 (RA-2009)	100 >	Min. 75
4	Flash Point, ^{0}C	IS :1209 -1978 (RA-2009)	298	Min. 220

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16.06.2014

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. H.S. Nataraj,** Contractor, Bangalore.
Name of the Work	Improvements to Roads, Drains and Asphalting to Roads in Vinayaka Layout 3rd Cross, 1st Stage in Ward No.07, Byatarayanapura, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-TND/470/2012-13 Dated: 20.03.2013
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	16.06.2014

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	387	389	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	84	82	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	303	307	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	21.71	21.08	**21.39**

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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16.06.2014

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
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Reference	EE/BTP/BBMP/E-TND/470/2012-13 Dated: 20.03.2013
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	16.06.2014

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	389	391	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	87	88	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	302	303	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	22.37	22.51	22.44

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/HSN/W.No.07/SDBC/Shape_T/2014-15 ; 16.06.2014

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	: **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	: **Mr. H.S. Nataraj,** Contractor, Bangalore.
Name of Work	: Improvements to Roads, Drains and Asphalting to Roads in Vinayaka Layout 3rd Cross, 1st Stage in Ward No.07, Byatarayanapura, BBMP, Bangalore.
Reference	: EE/BTP/BBMP/E-TND/470/2012-13 Dated: 20.03.2013
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 16.06.2014

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Result : Flakiness Index = **11.63%**

Elongation Index = **12.58%**

Result : Combined Flakiness & Elongation index **24.21%**

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/HSN/W.No.07/SDBC/Shape_T/2014-15 : 16.06.2014

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	: **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	: **Mr. H.S. Nataraj,** Contractor, Bangalore.
Name of Work	: Improvements to Roads, Drains and Asphalting to Roads in Vinayaka Layout 3rd Cross, 1st Stage in Ward No.07, Byatarayanapura, BBMP, Bangalore.
Reference	: EE/BTP/BBMP/E-TND/470/2012-13 Dated: 20.03.2013
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 16.06.2014

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Result : Flakiness Index = **11.84%**

Elongation Index = **13.63%**

Result : Combined Flakiness & Elongation index **25.47%**

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/HSN/W.No.07/SDBC/Stripping/2014-15 18.06.2014

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. H.S. Nataraj,** Contractor, Bangalore.
Name of the work	Improvements to Roads, Drains and Asphalting to Roads in Vinayaka Layout 3rd Cross, 1st Stage in Ward No.07, Byatarayanapura, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-TND/470/2012-13 Dated: 20.03.2013
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	18.06.2014

Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.2	3.33	96.67
2	3.5		
3	3.3		

Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/HSN/W.No.07/SDBC/Sp_Wa/2014-15

18.06.2014

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. H.S. Nataraj,** Contractor, Bangalore.
Name of the Work	Improvements to Roads, Drains and Asphalting to Roads in Vinayaka Layout 3rd Cross, 1st Stage in Ward No.07, Byatarayanapura, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-TND/470/2012-13 Dated: 20.03.2013
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	18.06.2014

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2030	2029	2031	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1275	1274	1276	
4	Weight of saturated surface dry aggregate in air	W_3 g	2024	2022	2023	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	749	748	747	
6	Weight of oven dried aggregate	W_4 g	2008	2005	2007	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.681	2.680	2.687	2.683
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.739	2.743	2.746	2.743
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.80%	0.85%	0.80%	0.81%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/HSN/W.No.07/SDBC/Bit/2014-15 18.06.2014

BITUMEN CONTENT DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AS per IRC:SP:-1984

CLIENT	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
AGENCY	**Mr. H.S. Nataraj,** Contractor, Bangalore.
NAME OF THE WORK	Improvements to Roads, Drains and Asphalting to Roads in Vinayaka Layout 3rd Cross, 1st Stage in Ward No.07, Byatarayanapura, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/E-TND/470/2012-13 Dated: 20.03.2013
SAMPLE I/D	Roads in Vinayaka Layout Ward No.07
DATE OF TESTING	18.06.2014

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	475	474.5
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	25	25.50
7. Bitumen content in %	5.00	5.10
8. Average	**5.05**	

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Job No.: CTCE/BBMP/HSN/W.No.07/SDBC/Bit/2014-15 18.06.2014

BITUMEN CONTENT GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IS2386 and IRC:SP:11-1984

CLIENT	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
AGENCY	**Mr. H.S. Nataraj,** Contractor, Bangalore.
NAME OF THE WORK	Improvements to Roads, Drains and Asphalting to Roads in Vinayaka Layout 3rd Cross, 1st Stage in Ward No.07, Byatarayanapura, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/E-TND/470/2012-13 Dated: 20.03.2013
SAMPLE I/D	Roads in Vinayaka Layout Ward No.07
DATE OF TESTING	18.06.2014

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	35.26	7.42	7.42	92.58	90-100
4.75	241.3	50.80	58.22	41.78	35-51
2.36	52.48	11.05	69.27	30.73	24-39
1.18	33.53	7.06	76.33	23.67	15-30
0.3	47.18	9.93	86.26	13.74	9-19
0.075	36.25	7.63	93.89	6.11	3-8

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	34.56	7.28	7.28	92.72	90-100
4.75	253.7	53.47	60.75	39.25	35-51
2.36	35.23	7.42	68.17	31.83	24-39
1.18	42.15	8.88	77.06	22.94	15-30
0.3	36.23	7.64	84.69	15.31	9-19
0.075	41.52	8.75	93.44	6.56	3-8

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Aggregate Gradation Test

IS : 2386 Part I

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. H.S. Nataraj,** Contractor, Bangalore.
Name of the Work	Improvements to Roads, Drains and Asphalting to Roads in Vinayaka Layout 3rd Cross, 1st Stage in Ward No.07, Byatarayanapura, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-TND/470/2012-13 Dated: 20.03.2013
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete (SDBC)
Date of Testing	18.06.2014

Total Weight of Sample: **5350** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	315	5.9	5.89	94.11	90-100	
4.75	2545	47.6	53.46	46.54	35-51	
2.36	847	15.8	69.29	30.71	24-39	
1.18	512	9.6	78.86	21.14	15-30	
0.3	493	9.2	88.07	11.93	9-19	
0.075	358	6.7	94.77	5.23	3-8	

Total Weight of Sample: **5250** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	305	5.8	5.81	94.19	90-100	
4.75	2647	50.4	56.23	43.77	35-51	
2.36	758	14.4	70.67	29.33	24-39	
1.18	523	10.0	80.63	19.37	15-30	
0.3	346	6.6	87.22	12.78	9-19	
0.075	387	7.4	94.59	5.41	3-8	

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